CHAPTER 3. MAINTENANCE/INSPECTION PROGRAMS FOR LOW APPROACH LANDING MINIMUMS

SECTION 1. BACKGROUND

1. PROGRAM TRACKING AND REPORTING SUBSYSTEM (PTRS) ACTIVITY CODES.

A. Maintenance: 3435

B. Avionics: 5435

3. OBJECTIVE. This chapter provides guidance for evaluating applications for lower approach and landing minimums in respect to the appropriate support program.

5. GENERAL.

A. Responsibilities.

(1) The Avionics aviation safety inspector's (ASI) primary responsibility is to provide technical support to the Operations ASI and the applicant. The responsibility for monitoring all applicants during the evaluation period should be coordinated between the Avionics and Operations ASIs, to include:

- Approvals
- In-flight evaluation observations
- Surveillance

(2) The applicant is responsible for obtaining and submitting all documents that establish the eligibility of its aircraft, such as:

- The required maintenance/inspection program necessary for continued eligibility
- The applicant's Minimum Equipment List (MEL), with the limitations for Category I operations, if applicable
- An acceptable means for maintaining the reliability of the flight guidance control and associated systems

B. Qualifications for Low Approach Landing Minimums. Low approach and landing minimums are issued to qualified operators operating under Title 14 of the Code of Federal Regulations (14 CFR) part 91, 121, 125, 129, or 135. While the operating rules for each of these authorizations may vary significantly, the approval guidelines do not. Approval for low or minimum approaches in all categories will require regulatory compliance in the following three major areas:

- Airborne equipment and systems
- Flightcrew and maintenance personnel qualifications
- Lowered minimum procedures, including a maintenance/inspection program

C. Deviations. Deviations will not be made without coordination between the Avionics and Operations ASIs. All requests for deviations must be forwarded to the Air Carrier Training Branch, AFS-210 and the Airmen and Avionics Branch, AFS-350 by the Operations ASI. The applicant will be advised not to proceed in operating under its lower minimum proposal until the deviation request is resolved.

7. CATEGORY I OPERATIONS. The Avionics ASI's responsibilities for Category I authorizations are to evaluate the flight director and/or autopilot systems. The principal operations inspector (POI) is responsible for determining the overall suitability of an operator's Category I capabilities.

9. CATEGORY II EQUIPMENT APPROVAL UNDER PARTS 91 AND/OR 135 (9 OR LESS).

A. Lower Approach Minimum Approval. An application for lower approach minimum authority will specify the basis for the aircraft approval to conduct lower minimum approaches. This authority will be based on:

- Type certification and the Airplane/ Rotorcraft Flight Manual
- Supplemental type certification
- Operational evaluation
- Any acceptable combination of the above

B. Requirements for Category II Approval.

(1) Requirements for Category II approval for general aviation operators have been established in part 91, §§ 91.189, 91.191, 91.193, 91.205, and appendix A (see the note below). These sections specify:

- Required instruments and items of equipment
- Methods of approval
- Evaluation program conduct
- Calibration standards
- Maintenance/inspection programs

NOTE: Part 91, appendix A is not referenced in the appropriate sections of §§ 91.189, 91.191, and 91.193. This has created some doubt on whether or not the provisions of appendix A are binding for Category II/III operations. Appendix A is mentioned in § 91.205(f)(2)—however, that provision applies only to the required equipment. Without specific reference in the regulations to maintenance provisions in appendix A, we would conclude that there is no regulatory requirement to use appendix A.

(2) Advisory Circular (AC) 91-16, Category II Operations—General Aviation Airplanes, as amended, is available to assist operators in developing and obtaining approval of Category II equipment installations and maintenance/inspection programs.

C. Operational Evaluation Programs. Engineering coordination should be requested when necessary, particularly for those aircraft in which the functions and limitations of the automated systems are significant factors for safe operation.

D. Flight Director Systems. Avionics ASIs will be aware that single flight director systems with dual displays in which the second display repeats only the Instrument Landing System (ILS) information on the pilot's display will not meet the requirements for two ILS receiving systems.

E. Optional Avionics Equipment. Optional avionics equipment installed by the operator will either be approved in the field or referred to the Aircraft Certification Office (ACO) for an engineering evaluation. The evaluation can assist in determining if flight testing is required, what limitations may apply, and whether or not the installation may require a Supplemental Type Certificate (STC). If an STC is required, Avionics ASIs will assist in the accomplishment of a compliance and conformity inspection, as necessary, when requested by the ACO. Optional equipment that may be installed and require approval includes the following:

- Flight director systems
- Automatic throttle control systems
- Autopilot and approach coupler systems
- Speed control command systems
- System fault detection and warning systems
- Radio altimeters

F. Alterations. ASIs should carefully review proposals to alter installed avionics equipment required for a particular category of operation and handle them in accordance with established procedures. Each proposal should be evaluated for its affect on system performance, compatibility with the original standard, and compliance with Category II criteria.

(1) When manufacturer-proposed alterations to existing avionics equipment appear to be major, the ASI will verify the approval status before sanctioning incorporation of the change by the operator. If Federal Aviation Administration (FAA) approval of the alteration is not clearly indicated in the manufacturer's instructions, the operator will obtain such approval before performing the alteration.

(2) An Avionics ASI will exercise a cautious approach to field approval of alterations. Pressure from any source must not discourage the Avionics ASI from verifying that the alteration is being made in accordance with approved technical data and that the technical evaluation is clearly within the scope of the Avionics ASI's training, experience, and approval authority.

(3) ASIs will also carefully examine alterations originating in an operator's engineering department and, when necessary, refer them to the appropriate ACO.

11. CATEGORY II/III EQUIPMENT APPROVAL UNDER PART 121/135 (10 OR MORE).

A. Large Aircraft Criteria. Operators using large aircraft operating under part 121 will meet the requirements in this chapter.

NOTE: AC 120-28, Criteria for Approval of Category III Weather Minima for Takeoff, Landing, and Rollout, or AC 120-29, Criteria for Approval of Category I and Category II Weather Minima for Approach, as amended, are available to assist operators in developing and obtaining approval of Category II/III equipment installations and maintenance/ inspections programs.

B. Turbojet Criteria. All operators using turbojet aircraft must comply with the aircraft systems evaluation criteria that applies to part 121 operators. Applicants certificated under part 135 using turbojet aircraft will also use the aircraft equipment evaluation standards.

C. Systems Evaluation Approval. Systems evaluation approval should be accomplished in accordance with AC 91-16, 120-28, or 120-29, as applicable.

D. Category II/III .

(1) The aircraft requirements for lower landing minimums (LLM) include requirements for the total aircraft performance and associated systems. The acceptance of an aircraft in either category must be completely based on performance and approved FAA data.

(2) Upon receiving an operator's request for LLM authorization, the assigned Avionics ASI should immediately contact the type certificating office. This action is to determine whether the aircraft has been approved for such operation and what equipment and systems have been approved. If the aircraft has not been LLM certified, the ASI should request assistance from the appropriate ACO so that an application for an STC can be properly consolidated.

13. CONTINUOUS AIRWORTHINESS PROGRAM FOR LOWER LANDING MINIMUMS (LLM).

A. This chapter outlines the requirements for the continuous airworthiness program. This type of operation will need a detailed evaluation supported by well-defined maintenance, training, and reliability programs. All maintenance and reliability supporting documents become part of the accepted program. A monthly utilization/reliability summary will be established for the applicable aircraft and is given to the FAA for the initial data collection/demonstration period of 1 year. Quarterly reporting after the initial period will be accomplished in accordance with the certificate holder's reliability.

B. The initial program should also include appropriate programs identified in the Maintenance Review Board (MRB) document. The frequency of maintenance actions may be revised when sufficient experience has been gained to justify a change and when there is no conflict with the certification requirements. MRB-specified tasks and/or other approved maintenance procedures may be revised to ensure the required airborne equipment will continue to meet total system performance, accuracy, availability, reliability, and integrity for the operation.

C. The reliability of systems and/or components set forth as substantiation for the LLM certification becomes the performance criteria for the program.

(1) Controlled monitoring of the LLM system reliability will require that the operator, after initial evaluation, incorporate the pertinent systems and components into the approved reliability program. If the LLM system reliability does not meet the approved program, the operator will be allowed a reasonable time period in which to improve the reliability.

(2) The ACO responsible for the type certification should be advised when the monthly removal rate is exceeded and informed of the probable cause. The reliability reporting is necessary, when operational approval was based on probability analysis.

D. The maintenance manual will identify all special techniques, maintenance/inspection frequencies, and test equipment requirements to support the program. It will also specify the method of controlling the operational status of the aircraft. Those technicians qualified to release an aircraft for LLM must be identified.

E. The operator's procedures must include a method for manual distribution to assure availability to the appropriate maintenance facility.

F. Operators will show the method of approval of required equipment as listed in the maintenance portion of the manual.

G. The operator must provide an approved training and recurrent training program. The list of personnel must be current. All maintenance personnel authorized to carry out this approved maintenance program must have training on the applicable aircraft systems and the

approved policy and procedures of the certificate holder's approved LLM aircraft maintenance program authorization. Only those persons trained and qualified should be permitted to perform LLM maintenance/ inspections.

H. The operational demand for LLM airborne systems with exposure to numerous hidden functions requires that the aircraft be either periodically exercised or functionally checked. This is to ensure that all systems are operational and that no dormant failure has occurred. The initial program will provide either a periodic LLM approach or periodic system functional check.

I. Until sufficient experience and data is available (excluding the 6-month demonstration), it is recommended the aircraft status period not exceed 35 days. Failure to exercise the system by simulated LLM approach or functionally checking the system within 35 days should automatically place the aircraft in a non-LLM status. The aircraft must maintain this status until the required functional check is made.

15. PROGRAM DEVELOPMENT.

A. Initial Development. At the time of formal application, the Avionics ASI will begin to monitor development activity. Participation in all meetings with an applicant will usually require coordination with the Operations ASI. It is important for the operator to include all key personnel in any meetings.

B. The Operator's Lower Minimums Program. The operator's lower minimums program must be developed and the procedures used during the evaluation period. Part D operations specifications must reflect all special LLM maintenance requirements that were developed to support repetitive evaluation of LLM systems and equipment.

17. MAINTENANCE/ INSPECTION PROGRAMS. The proposed maintenance/ inspection programs must be tailored to the applicant's operations and maintenance organization. All maintenance and reliability supporting documents become part of the accepted program.

A. Requirements for Maintenance/Inspection Programs. Maintenance/inspection programs will provide for the proper maintenance and inspection of equipment and aircraft systems.

B. Control and Accountability. Emphasis will be placed on control and accountability of all areas associated with LLM approvals. These areas primarily encompass the following:

- Initial and recurrent training on flight guidance control systems
- The use of test equipment
- The differences in aircraft systems between aircraft in an operator's fleet
- Special procedures for airworthiness release and control of the aircraft approach status
- Initial and recurrent training in all areas of the lower minimums program
- Training for new personnel and equipment types

C. Operational Status of the Aircraft. The method for controlling the operational status of the aircraft lower minimum required equipment must ensure that flight, dispatch, and maintenance personnel are kept aware of the current status.

D. Purchase of Avionics Equipment "Package" Installations. Some manufacturers and repair stations may develop general aviation maintenance/inspection programs in conjunction with their Category II avionics equipment installation "package." The contents of such programs should be thoroughly evaluated for compliance and maintainability with LLM regulations.

E. Requalification Procedures. The program must include procedures for requalification of an aircraft for lower minimums following maintenance on any required system. This must include tests after replacements, resetting in rack, and interchange of components.

F. Approval. The Avionics ASI will indicate approval of the maintenance program portion of the operator's Category II/III manual by signing and dating each page of the program.

19. MAINTENANCE TRAINING PROGRAMS. Avionics ASIs, during the course of normal surveillance, will evaluate the maintenance facilities performing Category II/III equipment maintenance to ensure that the training provided meets the requirements of lower minimum standards.

21. EXISTING CONTINUOUS AIRWORTHINESS PROGRAMS.

A. Programs can be developed to be compatible with the existing maintenance/inspection program, as

long as there is a clear distinction between normal and lower minimum requirements.

B. When an operator's proposal is based on an existing maintenance/inspection program, the ASI must ensure that all procedures will provide for the lower minimums program requirements. Caution will be exercised when an applicant has used a program approved for use by another operator for developing its own.

C. The following areas of the proposal and or existing programs will be closely reviewed:

- The existing maintenance or inspection program
- The existing reliability program
- The training program
- The initial evaluation checks for existing aircraft and for new aircraft
- The existing parts pool, borrowed parts procedure, and control of spare parts

D. An operator's existing reliability program may be accepted when shown to be adequate for its lower minimum operations.

23. TEST EQUIPMENT AND STANDARDS.

A. Performance Standards, Tolerances, and Calibration Procedures.

(1) Performance standards, tolerances, and calibration procedures applicable to ILS equipment have been adequately covered by:

- Technical Standard Orders (TSO)
- Radio Technical Commission of Aeronautics (RTCA) documents
- Manufacturers' instruction manuals

(2) These standards or their equivalent are generally considered acceptable for inclusion in maintenance/inspection programs for equipment operated to landing minimums of Category I. Such standards may not be adequate for Category II/III. Those, which will not provide category system performance, will be revised to provide the required level of performance.

B. LLM Tolerances. In many cases, the tolerances for Category II/III airborne equipment are more rigid than those for Category I. Therefore, the equipment used to inspect, test, and bench check Category II/III equipment may require more frequent test and calibration.

C. Established Standards and Tolerances. Standards and tolerance established in the maintenance/inspection program for testing and calibrating airborne equipment and systems that are required for Category II/III operations will not be relaxed following program approval without adequate substantiation that system performance will not be degraded.

D. Built-In Test Equipment (BITE) Test and Return to Service.

(1) The BITE test is a maintenance tool that can be used for return to service if certified by the aircraft manufacturer. The proper procedure for return to service is to perform an operational ground or functional flight check. The procedures in the manufacturer's maintenance manual, including the provisions of BITE, the fault isolation manual, the aircraft maintenance manual, and the operator's FAA-approved minimum equipment list are all essential portions in the process for an aircraft to be returned to service.

(2) For those aircraft for which BITE is minimal or non-existent or that have a mix of digital and analog equipment, then a more comprehensive functional test using test procedures and equipment prescribed in the manufacturer's maintenance manual will need to be accomplished before approval to return to service. On repeat discrepancies, the functional test must consist of the most comprehensive test in the maintenance manual for aircraft that have different levels of test complexities.

(3) The Category II/III maintenance manual will address the procedures for return to service.

25. MAINTENANCE PERIOD EXTENSIONS—GENERAL AVIATION.

A. Applications For Extensions.

(1) The Flight Standards District Office (FSDO) will consider applications for extensions of maintenance periods for general aviation operators at the completion of one maintenance cycle of at least 12 calendar months. Operators should apply to the FSDO having jurisdiction of the area in which the operator is located.

(2) The FSDO will consider the following factors in granting an extension:

- Records of Category II approaches due to malfunctioning equipment
- Number of Category II approaches (actual and simulated)
- Maintenance records of Category II equipment failures
- Service history of known trends toward malfunctioning
- Unit mean time between failures
- Records of functional flight checks

B. Check, Test, and Inspection Extensions. Extensions to the check, test, and inspection periods may be granted if factors indicate that the performance and reliability of the Category II/III instruments and equipment will not be adversely affected. General aviation extension periods, in most cases, would be one calendar month for tests, inspections, and functional flight checks, and four calendar months for bench checks. The operator's program should include procedures for obtaining the extensions.

C. Increased Extension Periods. The extension periods suggested in paragraph 25B may be increased at the discretion of the Avionics ASI.

27. FUNCTIONAL FLIGHT CHECKS. Some operators have submitted programs that provide for functional flight checks. This procedure must not be approved unless all airworthiness requirements have been satisfied before dispatch. In no instance can a functional flight check be substituted for the certification of complete systems or equipment operation.

29. REPORTS AND RECORDS.

A. Responsibilities of Recordkeeping. The owner/operator's organization will provide training to persons responsible for these reports in appropriate parts of the proposed LLM program.

B. Category III or Any Autoland Category. Operators authorized for any Autoland category will provide reports of airborne equipment malfunctions during actual approaches. They will submit the reports on a yearly basis to the FAA or at any time the malfunctions significantly affect the Autoland capability.

SECTION 2. PROCEDURES

1. PREREQUISITES AND COORDINATION REQUIREMENTS.

A. Prerequisites:

- Knowledge of the regulatory requirements of parts 91, 121, 125, 129, and 135, as applicable
- Successful completion of the Airworthiness Inspector Indoctrination course(s), or previous equivalent

B. Coordination. This task requires coordination with the Avionics and Operations ASIs, the applicant, and ACO, if necessary.

3. REFERENCES, FORMS, AND JOB AIDS.

A. References (current editions):

- 14 CFR parts 23, 25, and 61
- AC 91-16, Category II Operations—General Aviation Airplanes
- AC 120-28, Criteria for Approval of Category III Weather Minima for Takeoff, Landing, and Rollout
- AC 120-29, Criteria for Approval of Category I and Category II Weather Minima for Approach

B. Forms. None.

C. Job Aids:

- JTAs: 3.3.33, 3.3.144

5. PROCEDURES.

A. Review the Maintenance/Inspection Program. Review the applicant's maintenance/inspection program to ensure that it contains control and accountability over the following:

(1) All maintenance accomplished on lower minimum required systems and equipment.

(2) All alterations to systems and equipment.

(3) Approach status of each aircraft at all times.

(4) Return to service procedures to upgrade aircraft to Category II/III status.

(5) Spare equipment.

(6) Maintenance calibration, use of test equipment, records/reporting requirements.

(7) Repetitive and chronic discrepancies to ensure the affected aircraft remains out of lower minimums approach status until positive corrective actions is made.

(8) All aircraft in the fleet that have not been evaluated for lower minimums approaches.

B. Review the Existing Maintenance/Inspection Programs. Ensure that the existing maintenance/inspection program has procedures for the following:

(1) Identifying chronic discrepancies and corrective action followup.

(2) Keeping aircraft with chronic and/or repetitive discrepancies out of a lower minimum status until positive corrective action is taken.

(3) Training maintenance personnel assigned to reliability analysis.

(4) Conducting initial evaluation checks for existing aircraft and for new aircraft to the fleet before inclusion in the operator's lower minimum operations.

(5) A means for identifying all Category II/III components used in the applicable aircraft systems in the existing parts pool, parts borrowing procedure, and control of spare parts.

(6) Ensuring that calibration standards for all test equipment used for maintaining lower minimum systems and equipment are met.

(7) Ensuring that each flightcrew and persons with operational dispatch authority are aware of any equipment malfunction that may restrict lower minimum operations.

(8) Submitting any changes to the LLM maintenance program to the FAA for acceptance and approval by the principal avionics inspector (PAI) before any changes are adopted.

C. Review the Functional Flight Checks. If a functional flight check has been submitted, ensure that the following information is included:

(1) Maintenance clearance and/or concurrence before an aircraft is returned to a lower minimum

status, even if the functional flight check was found to be satisfactory.

(2) Request for a flight check by maintenance in the aircraft log.

(3) Maintenance entry acknowledging the results and the action taken.

D. Evaluate the Supporting Data. Unless the applicant provides supporting approval data, the Avionics ASI will coordinate with the Operations ASI and the ACO responsible for the type certificate to determine the acceptability of each aircraft for the authorizations requested.

E. Review the Minimum Equipment List (MEL). Appropriate sections of the MEL must be revised to identify Category II/III required systems and special procedures, if applicable.

F. Review the Personnel Training Requirements. Ensure there are procedures for the following:

(1) All maintenance personnel involved and authorized to carry out this approved maintenance program must have initial and recurrent specialized training on the applicable aircraft systems and the approved policy and procedures of the certificate holder's approved LLM aircraft maintenance program authorization.

(2) Ensuring personnel contracted to perform Category II/III related maintenance are qualified and the program requirements are made available to these persons.

(3) Personnel not qualified to perform maintenance on Category II systems and equipment, including flightcrew and dispatch, will be trained in the airworthiness release requirements of the lower minimums program.

7. TASK OUTCOMES.

A. Complete PTRS.

B. Complete the Task. The POI has the primary responsibility to grant the operator approval for lower minimums after concurrence from the Flight Technologies and Procedures Division, AFS-400. It is the Avionics ASI's primary responsibility to evaluate and approve the Category II/III maintenance requirements and associated support programs after concurrence of the Aircraft Maintenance Division, AFS-300. Successful completion of this task will therefore consist of coordination with the Operations ASI for sending all original Category II and III documentation to AFS-400 for review and concurrence.

9. FUTURE ACTIVITIES. None.